DESCRIPTION

OPTICAL DISK REPRODUCING DEVICE

Technical Field

The present invention relates to an optical disk reproducing device (International Patent Classification G11B 7/00), and particularly to an optical disk reproducing device in which spin-up processing of the optical disk reproducing device and a method of controlling rotation of a spindle motor during low-speed rotation of the optical disk are carried out by CAV control (constant angular velocity control).

Background Art

Such an optical disk reproducing device is configured as shown in FIG. 2.

An optical disk 1 is rotationally driven by a spindle motor 2. An optical head 3 reading information from the optical disk 1 is driven by a traverse motor 4 in a radial direction of the optical disk 1.

An output signal of the optical head 3 is inputted to a DSP (digital signal processor) 5 via an amplifier 4. The DSP 5 controls the focus of the optical head 3 via an actuator driver 6 so as to suitably set the focus of the optical head 3. Further, the DSP 5 controls both of a spindle motor 2 and a traverse motor 4 via a spindle traverse driver 7 so as to suitably drive the motors 2, 4.

A CPU 8 is a central processing unit which is operated by a control program and sends an instruction to make the DSP 5 carry out desired processing. An ECC & I/F9 has an ECC (error-checking and correction) function and an interface function and is a device for controlling the communication with a host computer. A DRAM 10 is a memory for temporarily

storing read data. Reference numeral 11 denotes a system control processing section.

Incidentally, as for an optical disk, the following method has been generally adopted: information is recorded with an equal density entirely from an inner periphery to an outer periphery. In an optical disk reproducing device for reproducing such an optical disk, as for spindle motor rotation control during spin-up processing, a method using CLV control (constant linear velocity control) has been known in general. The CLV control is a method of changing the number of rotations according to a position of an optical head in a radial direction and obtaining a constant length of a track, which is read by the optical head in a unit time.

FIG. 3 is a flowchart showing the above processing.

In step S1, setting is made to drive the spindle motor 2 at a constant linear velocity by CLV control. In step S2, servo adjustment is carried out. In step S3, a LEAD-IN final address is acquired. In step S4, CLV measurement is carried out at the above address by CLV control.

In step S5, control is accomplished such that the spindle motor 2 is switched from CLV control to CAV control and a constant angular velocity is obtained.

In step S6, an angular velocity is changed to a half of a maximum rotational speed (twelve-speed at a maximum of twenty-four-speed).

In step S7, TOC (table of contents) serving as index information of the disk is read.

In step S8, SUB-Q (additional information for providing data with a high-level function) less than 00:02.00 is acquired.

In step S9, a HEADER difference is acquired based on the SUB-Q of step S8 and READ SET is carried out.

In step S10, the velocity changed in step S6 is reset and HOLD TRACK is carried out.

As described above, when processing before a read standby state is carried out using CLV control (constant linear velocity control), the number of rotations on the inner periphery and the outer periphery is changed according to the position of the optical head. Therefore, it is always necessary to monitor data recorded in the optical disk.

Thus, when the optical head is out of focus or tracking, it is not possible to find a present rotational speed. Therefore, it is necessary to reduce the number of rotations of the optical disk to carry out re-pull-in of CLV, resulting in a problem of a longer spin-up time.

Disclosure of Invention

An object of the present invention is to provide an optical disk reproducing device configured such that even if an optical head is out of focus, an operation for re-pull-in of CLV is not necessary, and it is possible to shorten the time to wait for the rotation of an optical disk, shorten the seek time to arrive at inner and outer peripheries, accomplish stable control, and shorten the spin-up time.

According to the optical disk reproducing device of the present invention that is devised to solve the above problem, processing before a read standby state is divided into steps and all the steps are carried out by CAV control (constant angular velocity control).

According to the above configuration, even if the optical head is out of focus, it is not necessary to change the number of rotations. Therefore, unlike CLV control, it is not necessary to reduce the number of rotations of the optical disk to carry out re-pull-in of CLV. Further, since the time is shorter to wait for the rotation of the optical disk, it is possible to shorten the seek time to arrive at the inner and outer peripheries, accomplish stable control, and shorten the spin-up time.

An optical disk reproducing device according to claim 1 of the present invention is characterized in that the control of a spindle motor is accomplished by CAV control (constant angular velocity control) during a process from a start of the spin-up processing to the read standby state in the optical disk reproducing device for reproducing disk-shaped recording media, on which recording is made with a constant linear velocity.

According to the configuration of the present invention, even if the optical head is out of focus or tracking, it is not necessary to reduce the number of rotations of the optical disk to carry out re-pull-in of CLV. Further, since the time to wait for the rotation of the optical disk is reduced, it is possible to shorten the seek time to arrive at the inner and outer peripheries and to accomplish stable control.

An optical disk reproducing device according to claim 2 of the present invention is characterized in that, in claim 1, the control of the spindle motor is accomplished by CAV control (constant angular velocity control) during a control processing when the disk-shaped recording media rotates at a low speed.

Brief Description of Drawings

FIG. 1 is a flowchart showing spin-up control processing in an optical disk reproducing device of the present invention;

FIG. 2 is a typical block diagram showing an optical disk reproducing device; and

FIG. 3 is a typical flowchart showing spin-up control processing in the optical disk reproducing device.

Best Mode for Carrying Out the Invention

Referring to FIG. 1, an embodiment of the present invention will be described below.

Here, since the configuration of the hardware is identical to FIG. 2 showing the conventional art, the explanation will be made with the same reference numerals.

FIG. 1 shows system control processing from physical spin-up processing to a read standby state in an optical disk reproducing device of the present invention.

In step S1, setting is made to drive a spindle motor 2 by CAV control (constant angular velocity control) instead of conventional CLV control (constant linear velocity control). In step S2, servo adjustment is carried out. In step S3, a LEAD-IN final address is acquired. In step S4, CLV measurement is carried out.

In step S5, an angular velocity is changed to a half of a maximum rotational speed (twelve-speed at a maximum of twenty-four-speed).

In step S6, TOC (table of contents) serving as index information of the disk is read.

In step S7, SUB-Q (additional information for providing data with a high-level function) less than 00:02.00 is acquired.

In step S8, a HEADER difference is obtained based on the SUB-Q of step S7 and READ SET is carried out.

In step S9, the velocity changed to a half in step S5 is reset and HOLD TRACK is carried out.

According to the above configuration, since all the steps are carried out by CAV control, it is possible to shorten the time to wait for the rotation and the seek time.

As described above, according to the optical disk reproducing device of the present invention, when reproducing the optical disk having information recorded on the entire surface with an equal density, the process from the start of spin-up processing to the read standby state is entirely carried out by CAV control. Thus, even if the optical head is out of focus, it is possible to keep a stable number of

rotations, reduce the time to wait for the rotation, and shorten the seek time, resulting in a shorter spin-up time.